

Leaf-litter inhabitant weevils (Coleoptera: Curculionidae) in a small forest refuge fragment among hazelnut orchards at Trabzon

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Abstract

The leaf-litter weevil diversity in a natural forest refuge fragments among in hazelnut orchards is investigated at eastern Black Sea Region. Ten weevil species *Curculio nucum* (Linnaeus, 1758), *Curculio glandium* Marsham, 1802, *Acalles caucasicus* Reitter, 1891, *Anoplus roboris* (Suffrian, 1840), *Anchonidium caucasicum* (Motschulsky, 1845), *Plinthus osellai* Meregalli, 1985, *Ceutorhynchus picitarsis* Gyllenhal, 1837, *Coeliodes transversealbofasciatus* (Goeze, 1777), *Pseudomylocerus schneideri* (Schilsky, 1911) and *Trachodes hystrix* Gyllenhal, 1836 are found by litter reducer. Of these, *Trachodes hystrix* is new record for the fauna of Turkey.

Keywords: Leaf-litter, Weevil diversity, New records, Trabzon, Turkey

Introduction

Leaves, twigs and pieces of bark that have fallen to the ground make up leaf litter. Leaf litter is an important component of healthy soil and also serves as great nesting material, hiding places and protected habitats for animals. This dead organic material provides the perfect habitat for organisms, including insects as well as beetles. For this reason, leaf litter is considered very biodiverse (Lin, 2012).

The beetle fauna of leaf litter represents a particularly rich, diverse, and largely specialized community (Owens and Carlton, 2015). Leaf-litter beetles cover the breadth of terrestrial niches, including herbivores and detritivores, and they are key decomposers in terrestrial systems (Burghouts et al., 1992). A propensity to endemism results from a broad range of dispersal abilities. Litter-beetle diversity has received some attention in the comparative diversity studies of forest types (Caterino et al., 2017). One of the best samples regarding

leaf-litter weevil fauna is to a monograph by Anderson (2010) who described 94 new species in a single genus *Theognete* Champion (Coleoptera: Curculionidae) from Middle America.

The hazelnut *Corylus* L. (Betulaceae: Coryloideae) genus contains a wide diversity of deciduous shrub and tree species that are important components of many temperate forests across the Northern Hemisphere, all bearing edible nuts (Molnar, 2011). *Corylus* species distributed in Japan, Korea, and China, through Tibet, India, northern Iran, Turkey, the Caucasus, Europe, and in North America, comprises anywhere from 9 to 25 species depending on the authority (Molnar, 2011; Yoo and Wen, 2007). According to Turkish Plants Data Service (TÜBİVES), three species *Corylus avellana* L., *C. colurna* L. and *C. maxima* Miller are distributed in Turkey. Of these, *C. avellana* is the most widely distributed and *C. maxima* is cultivated one. As primary hazelnut producer in the world, Turkey is a homeland of hazelnut and cultivated in the

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northern Anatolia mainly eastern Black Sea Region (İslam, 2018). Many insect and mite species associated with *Corylus* in Turkey, six species are considered as serious pest and three of them from weevils (Curculionidae), *Curculio nucum* is the most important species (Tuncer and Ecevit, 1997).

In this paper, the litter weevil findings at hazelnut orchards and small patch of natural forest refuge among them in a village of Trabzon are presented.

Material and Methods

The specimens were collected by litter reducer (Ento Sphinx) (Figs 1C, D) at natural forest refuge fragment (Figs 1A, B) among hazelnut gardens in Arsin district, Trabzon province in eastern Black Sea Region of Turkey between 2014-2019. The shifted litter was spread out on a white sheet, waited about 1-2 hours at open area getting sun light, walking specimens on litter were collected by aspirator or hand. The individuals were killed using ethyl acetate and were mounted on a paper card with water soluble glue in the laboratory. Photographs were taken with a Canon DSRL 70D camera attached to Leica Z6APO Macroscope managing Canon EOS Utility software. The digital images were combined to stack using Adobe Photoshop CS 6.0. software.

Results

Acalles caucasicus Reitter, 1891

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 1♂, 2♀ L. & N. Gültekin leg.; 14.07.2019, 1♀, N. Gültekin leg.

Distribution. Armenia, Georgia, Russia, Turkey (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Castanea sativa* Miller, *Quercus pontica* C. Koch, *Fraxinus angustifolia* Vahl., *Laurocerasus officinalis* Roemer and *Fagus orientalis* L. at small patch of natural forest refuge among hazelnut orchards.

Remarks. This genus weevils were captured on dead tree branched, especially from *Quercus* and *Fagus* (Scherf, 1964).

Anchonidium caucasicum (Motschulsky, 1845) (Fig. 1F)

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 2♂, 2♀ L. & N. Gültekin leg.; 14.07.2019, 1♂, 1♀, N. Gültekin leg.

Distribution. Bulgaria, Romania, Russia, Turkey, Ukraine, Georgia (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Castanea sativa* Miller, *Quercus pontica* C. Koch, *Fraxinus angustifolia* Vahl., *Laurocerasus officinalis* Roemer and *Fagus orientalis* L. at small patch of

natural forest refuge among hazelnut orchards.

Remarks. This species recently transferred to the genus *Anchonidium* by Savitsky (2018).

Anoplus roboris (Suffrian, 1840)

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 3♂, 2♀ L. & N. Gültekin leg.; 14.07.2019, 2♂, 3♀, N. Gültekin leg.

Distribution. Belgium, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Corylus maxima* Miller at garden of hazelnut and *Alnus glutinosa* (L.) in at small patch of natural forest refuge among hazelnut orchards.

Remarks. This leaf mining species is known as hazelnut pest in Black Sea Region of Turkey (Işık et al. 1992; Ecevit et al., 1993) and live in leaves of *Alnus glutinosa* (L.) Gaertner in France (Hoffman, 1954; Scherf, 1964).

Ceutorhynchus picitarsis Gyllenhal, 1837

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 14.07.2019, 1♀, N. Gültekin leg.

Distribution. This species widely distributed Europe, North Africa, Transcaucasia, Iran, Turkmenistan and Turkey (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Alnus glutinosa* (L.) Gaertner.

Remarks. This species feeds on Brassicaceae (Colonnelli, 2004), known as vegetable crop pest, host plants include *Brassica napus*, *B. rapa*, *B. oleracea* (Scherf, 1964).

Coeliodes transversealbofasciatus (Goeze, 1777)

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 14.07.2019, 1♂, 1♀, N. Gültekin leg.

Distribution. Europa, Morocco, Azerbaijan, Armenia, Cyprus, Georgia, Iran, Syria (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Quercus pontica* C. Koch at small patch of natural forest refuge among hazelnut orchards.

Remarks. The host plant is *Quercus sessilis* and larva lives in female flowers (Scherf, 1964)

Curculio glandium Marsham, 1802

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 1♂, 2♀ L. & N. Gültekin leg.

Distribution. This species widely distributed Europe, North

Africa, Transcaucasia, Middle East, Russia (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Quercus pontica* C. Koch, at small patch of natural forest refuge among hazelnut orchards.

Remarks. Larvae develop inside acorns of *Quercus robur*, *Q. sessilis* (Hoffmann, 1955; Scherf, 1964).

***Curculio nucum* (Linnaeus, 1758)**

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 16.06.2018, 2♂, N. Gültekin leg.

Distribution. This species widely distributed Europe, Turkey, Morocco (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Corylus maxima* Miller at garden of hazelnut.

Remarks. It is one of the most important *Coryllus* pest in Turkey (Tuncer and Ecevit, 1997).

***Plinthus osellai* Meregalli, 1985 (Fig. 1E)**

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 2♂, 2♀ L. & N. Gültekin leg.; 14.07.2019, 1♂, 1♀, N. Gültekin leg.

Distribution. Endemic for Turkey (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Castanea sativa* Miller, *Quercus pontica* C. Koch, and *Laurocerasus officinalis* Roemer at small patch of natural forest refuge among hazelnut orchards.

Remarks. It is an endemic species for Turkey (Alonso-Zarazaga et al., 2017) and was described from Sümela-Trabzon (Meregalli, 1985). This is the first finding specimens after description and second location.

***Pseudomylocerus schneideri* (Schilsky, 1911)**

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 14.07.2019, 3♂, 2♀, N. Gültekin leg.

Distribution. Azerbaijan, Armenia, Georgia, Russia (South European territory), Turkey (Alonso-Zarazaga et al., 2017).

Habitat. Litter under *Alnus glutinosa* (L.) Gaertner L. at small patch of natural forest refuge among hazelnut orchards.

Remarks. This species was recently recorded from Armenia, Azerbaijan and Turkey, collected on *Alnus glutinosa* at Artvin (Korotaev et al., 2015).

***Trachodes hystrix* Gyllenhal, 1836: 513 (Fig. 2)**

Material examined. Turkey: Trabzon Prov., Arsin District, Fatih neighborhood, 40°56'36"N, 39°55'41"E, 125 m, 21.06.2014, 1♂, 1♀ L. & N. Gültekin leg.; 14.07.2019, 1♂,

2♀, N. Gültekin leg.

Distribution. Azerbaijan, Georgia, Iran, Russia (South European territory), Turkmenistan (Alonso-Zarazaga et al., 2017). Turkey, present finding and new record.

Habitat. Litter under *Fagus orientalis* L., *Castanea sativa* Miller, *Quercus pontica* C. Koch and *Laurocerasus officinalis* Roemer at small patch of natural forest refuge among hazelnut orchards.

Remarks. This species *Trachodes hystrix* (Fig. 2) is closely related to *Trachodes hispidus* (Linnaeus, 1758) and not easy to differentiate them always. Body size, smaller (2.6-2.8 mm) than *T. hispidus* (3.3-3.5 mm). Both species have leaf-like erect scales on pronotum and in a row on 1., 3., 5., 7., interstriae; apex of scales is almost straight on *T. hystrix* for majority of scales while roundish on *T. hispidus*. Postocular lobes less developed than *T. hispidus*. First interstria of *T. hispidus* narrower than *T. hystrix* One of the most important discriminative character between these two species is the shape of ridge between lower margin of metepisternum between upper margin of metaventrite which bears a row miniature vertically sorted leaf-like scale. This metepisternal ridge sinuous on *T. hispidus*, 0.88x as long as diameter of eyes, number of vertical scales less than 20 (usually 17-18); metepisternal ridge straight on *T. hystrix*, 1.1x as long as diameter of eyes, number of vertical scales more than 20 (usually 22-23). Median ventral tooth of fore tibia robust on *T. hispidus*, moderate size on *T. hystrix*.

According to EPPO report on forest pest in the former USSR, *T. hystrix* develops in trunks of *Fagus* and *Juglans* at Transcaucasus. In a study conducted in Ukraine, this weevil was collected in forest of *Pinus pallasiana* (Lamb.), *Fagus orientalis* and *Quercus petraea* (Mattuschka) Liebl. (Yunakov and Nazarenko, 2003).

Discussion

In this present paper, the litter weevils finding is originated solely a single village at Trabzon where first author' village. Ten weevil species were captured in a rather small restricted forest refuge land approximately two decares among hazelnut orchard. Of these, one of them is new records for fauna of Turkey, one of them is rare endemic species known only from type locality. It is obviously seen that this small natural forest refuge fragment is how so rich with comparatively with presence only two pest weevil species at hazelnut orchard. Presence of this kind natural forest fragments as natural reserve refuge habitats in cultivated agricultural land is great value and having rather importance to survive biodiversity components.

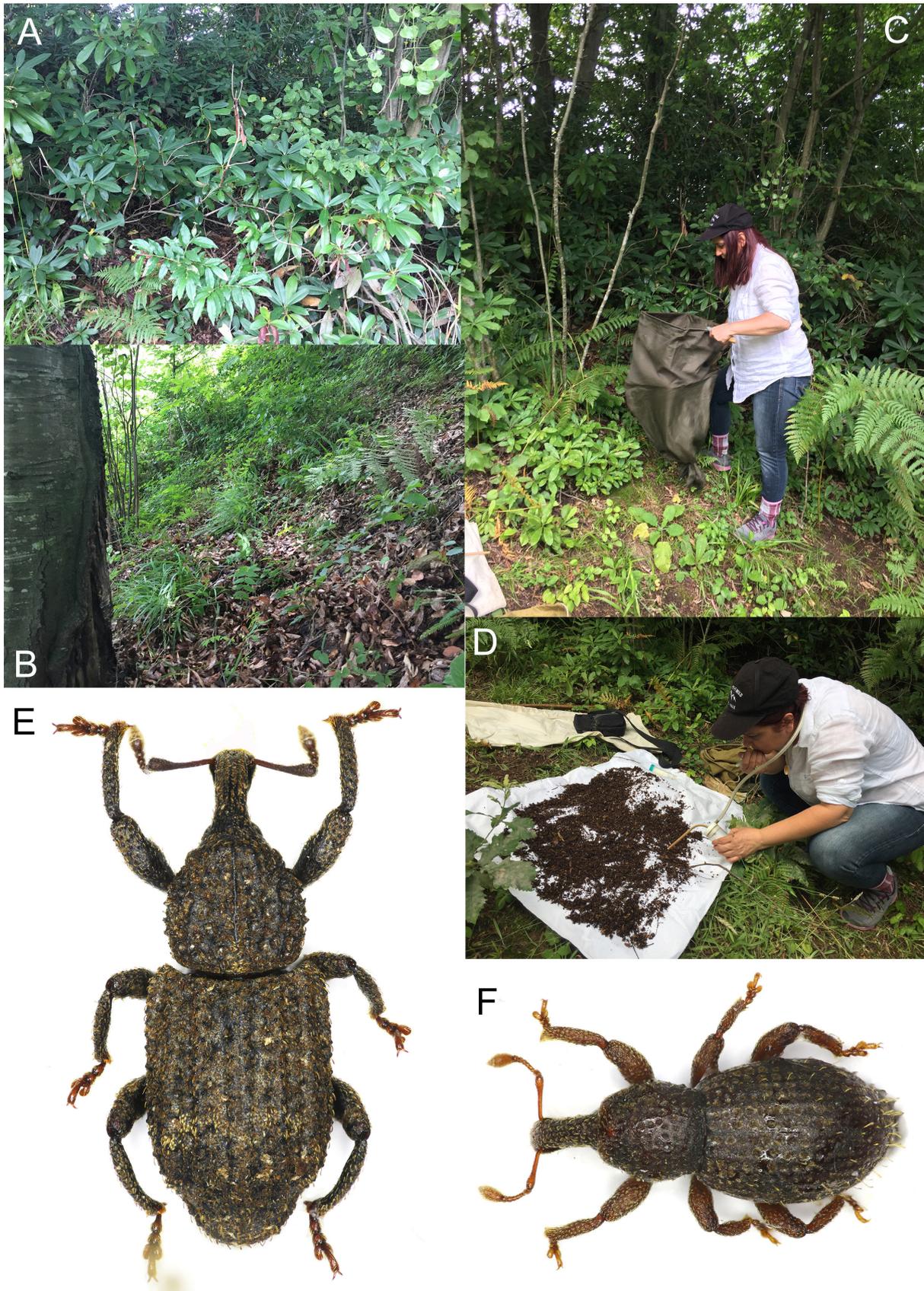


Figure 1. Leaf-litter habitat and collecting with litter reducer with two litter inhabitant weevils. A, *Laurocerasus officinalis* Roemer; B, litter under *Fagus orientalis* L.; C, hazelnut garden margin in natural forest fragment and collecting equipment litter reducer; D, collecting weevils from litter; E, *Plinthus osellai* Meregalli; F, *Anchonidium caucasicum* (Motschulsky).



Figure 2. Habitus of *Trachodes hystrix* Gyllenhal, 1836, dorsal view.

Compliance with Ethical Standards**Conflict of interest**

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author contribution

The author read and approved the final manuscript. The author verifies that the Text, Figures, and Tables are original and that they have not been published before.

Ethical approval

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Data availability

Not applicable.

Consent for publication

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